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ANTHROPOMETRY AND EXPERIMENTAL PSYCHOLOGY.

ONE of the features of the International Health Exhibition held in London nine years ago was the Anthropometric Laboratory, conducted under the direction of Mr. Francis Galton. The instruments in action dealt with "keenness of sight, the color sense, judgment of eye [visual estimation of length, etc.], [keenness of] hearing, the highest audible note, breathing power, strength of pull and squeeze, swiftness of blow, span of arms, height (sitting and standing), and weight." Craniometry was purposely omitted. Instruments for measuring delicacy of touch (sensibility to pressure, etc.) were exhibited, but not used.[1] This laboratory may be taken as fairly typical of its kind. Further subjects to be anthropometrically investigated would be, *e.g.*, sensible discrimination, reaction time, mental fatigue.[2]

Such a laboratory will form part of the anthropological exhibition at the coming World's Fair. But, in addition to it, the working of a psychological laboratory will be exemplified. That is, there will be a special exhibit of psychological instruments, and a series of psychological tests, beside the anthropometrical. These psychological tests have been provisionally determined somewhat as follows : keenness of sight, the color sense, judgment of eye (estimation and discrimination of lengths, forms, etc.), touch (discrimination, weight, pain, etc.), movement (discrimination, rate), time-sense, reaction time, mental fatigue, memory, association, etc.[3]

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[1] Francis Galton : On the Anthropometric Laboratory at the late International Health Exhibition. London, 1885. [Journal of Anthropological Institute, Feb., 1885.]

[2] F. Galton : Exhibition of Instruments for testing perception of differences of tint, and for determining reaction-time. London, 1889. Remarks or Replies by Teachers to Questions respecting Mental Fatigue. London, 1888. [Journal of Anthrop. Inst., August, 1889 and November, 1888.]

[3] Experimental Psychology at the World's Fair : Address delivered by Prof. J. Jastrow to the American Psychological Association at Philadelphia, Dec. 27, 1892.

This preliminary scheme, though more extensive than that of the London Laboratory, is plainly co-ordinate with the latter over a very large range of subjects. One is tempted to ask, then : What will be done in the anthropometric laboratory proper? Or, to give the question a more general form : What constitutes the difference between a psychological and an anthropometrical experiment?

Obviously, a number of investigations — those into height, weight, span of arms, size and shape of head, and so forth — can be ruled out at once. They have no direct connection with psychology. Where, in the other cases, does anthropometry end, and psychology begin? Let us consider a typical instance; that of reaction time. To the psychologist, the reaction experiment has a threefold importance. Firstly, it presents a means of training the student of psychology in the exclusively psychological method, — introspection. Secondly, the reaction is the exact type of a voluntary action: practice in it is practice in control of attentional direction. Thirdly, its time value may be useful for the temporal definition of mental processes ; though this, its most patent aspect, has up till now proved itself the most difficult to turn to true psychological account. And all this implies that psychological experimentation in the sphere of reaction is no easy matter. The subject must be educated by a long course of practice ; all disturbing influences must be eliminated, whether they are external or internal ; the recording apparatus must be the most accurate possible. More than that : not every one is capable of acting as subject. The psychological *Anlage* is necessary here, just as is the physiological in experiments upon the nervous system. Of seven normal persons who offered to take part in an investigation of my own into the reaction time of visual discrimination, only two proved to possess the needful power of concentration of the attention, patience, and ability to control their results at all constantly by introspection. Nor is this by any means an isolated experience.

With the anthropometrical reaction it is quite different. The experiment is not controlled, as regards direction of the attention, etc. Its whole importance is centred in the time result, which is statistically treated. Any and every person is accepted as subject; the time curves being plotted with reference at most to differences of age, occupation, and the like, — not with regard to the psychological processes underlying the experimentation. And so with the other subjects common to the anthropometrical and psychological lists. In the paper above quoted Mr. Galton writes: "In testing the delicacy of the senses, I think we should do wrong if we pursued the strict methods appropriate to psycho-physical investigations. We do not want to analyse . . . the many elementary perceptions called into action. It is the total result that chiefly interests us. Thus . . . [a person] ought to be allowed to handle weights in the way he prefers, and we may disregard the fact that his judgment rests on a blend of many different data, such as pressure, muscular exertion, and appreciation of size."[1]

So far, then, it might seem that the difference between anthropometry and psychology is mainly a difference of end. The experiments are pretty much the same, except that the psychological are more exact; but their results are put to different uses. It should not be difficult to vary them, so as to make these more distinctively anthropometrical, those more distinctively psychological. And all this could have been foreseen, and need not have been specially emphasized here.

Perhaps I can state my argument most emphatically, if I say at once, and in one word, that the difference above and beyond these differences is that of practice. Of course, the widest interpretation must be given to the term. I mean, that an experiment of the type under discussion becomes a psychological experiment, whatever its additional anthropometric value may be, when the subject is a psychologist; whereas the "psychological" experiment, for which the subject has not been psychologically trained, can (with very few exceptions, of which more presently) only have an anthropometric value. To take the first analogy that occurs: suppose that the average

[1] On the Anthropometric Laboratory, etc., p. 4.

man is given materials, and required to make bread. The results will have some anthropological value; it is of interest to know that this or that way will be so and so often followed. From the baker's point of view, on the other hand, they will possess but little worth. Now it is one of the commonest errors, that since we are all using our minds, in some way or another, everyone is qualified to take part in psychological experimentation. As well maintain, that because we all eat bread, we are all qualified to bake it.

The position will not be granted, at first sight. It will be objected that the end of the experiment is, after all, the justification of its name,—for we receive untrained students into our university laboratories, and all agree in calling their work psychological. It is, unfortunately, true that an adequate preparation for experimental investigation is very rare among those who enter the psychological laboratory. But, of course, the fact of entering does not make them psychologists; training is needed, as it is in Physiology or in any other science. And the whole objection really supports the argument. If the end of the psychological experiment be Psychology, then assuredly such a laboratory as that outlined above is not psychological; for its chief end is not knowledge of mental process, but statistics relating to "human faculty."

To resume, then. The psychological experiment presupposes, almost universally, practice;—practice in introspection, practice in attentional concentration, practice in the control of the particular apparatus employed. The anthropometrical experiment requires at most only so much practice as is necessary for the correct carrying out of instructions. The value of the former is—or should be—as much qualitative (for analysis and description) as quantitative; the value of the latter is solely quantitative. The similarity of the methods employed by the two sciences ceases to be misleading, when we remember the relation of these to one another. As is social psychology to anthropology, so is individual psychology to anthropometry.

We have been dealing with those experiments which are common, in name at least, to the psychological and anthropometrical laboratories. Certain experiments, as we saw, belong exclusively to the latter. Are there not others, which would serve to throw light upon the working of consciousness, the course of mental processes, without presupposing a special training of the subject? The first themes to suggest themselves are undoubtedly those which find representation on the list made out for the World's Fair Laboratory: association, memory, illusions. Even here, however, the path is not free from difficulty. The psychological experiment upon association should be carried out under conditions which ensure, so far as this is possible, entire absence of preoccupation on the part of the experimentee.[1] Experiments on memory demand a continuance of the interest of visitors, outside of the laboratory. The facts of optical illusion are patent enough, but their explanation is not so easy.

The foregoing criticism has been wholly destructive. I would suggest something like the following plan, — very diffidently, for no one is less inclined to underestimate the difficulty of the problem, — by way of reconstruction. All or nearly all of the experiments already quoted should be carried out in the anthropometric laboratory. This latter should have two exits, one of them being the entrance to the psychological laboratory. Only those persons would enter this latter, therefore, to whom the anthropometric tests had been applied, and who had thus gained some knowledge of the methods and instruments which anthropometry shares with psychology in their simpler forms. Such an arrangement would, without doubt, mean a great reduction in the total number of visitors to the laboratory; but those who entered it would be evincing a more serious interest in the questions of the science, and their comparative fewness would enable the attendants to devote more time to them individually. The laboratory itself should contain a series of psychological apparatus, — as much as possible of it being demonstrated in action, — and, in addition to charts and diagrams, there should be a very full guide-book explaining the purpose of the instruments, and tabulating the results obtained with them, emphasis being laid throughout on the psychological value of the experimentation. These guide-books, one of which would be taken away by every visitor, would probably do more than the laboratory exhibits to spread a knowledge of the aims and achievements of the new psychology. As for actual experimentation, the influence of direction of the attention on reaction time, qualitative association, optical illusions, tonal fusion, the phenomena of contrast, and similar subjects might be illustrated by a typical experiment ; it being made clear that the experiment has, in most cases, no more than an illustrative value, while a statement of the present position of the science as regards the various departments of investigation is found in the guide-book.

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[1] E. W. Scripture: Ueber den associativen Verlauf der Vorstellungen. *Phil. Stud.*, VII, p. 53.

Only in some such way as this does it seem possible to give a tolerably adequate representation of experimental psychology in a popular manner. The success of the undertaking would be mainly dependent on the intelligibility and completeness of the guide-book. As a matter of fact, it is as impossible to show a psychological laboratory at work, in expositional surroundings, as it would be to repeat Hertz' experiments in a drawing-room.

It is, I hope, unnecessary to add that these remarks are not in any way intended to disparage anthropometry. It is as unfair to her to rob her of experiments and dub them psychological, as it is to psychology to conceal the difficulty of her own experimentation by substituting the simpler anthropometrical for it. Let psychology maintain the closest relations with anthropology; the benefit will be mutual. But, if we identify them, we put the seal of scientific approval on a popular belief which is no more true, though it may be less irritating, than the view which confuses psychology with 'psychical science.'

E. B. TITCHENER.